CLAIMS

What is claimed is:

1. A method of decomposing an image comprising the steps of:

a) decomposing the image into a plurality of stripes;

b) decomposing each stripe into foreground and background image layers, and a mask layer; and

c) applying a smoothing filter to interpolate irrelevant pixel values in the foreground and background layers for wavelet encoding efficiency.

2. The method of claim 1 further comprising the step of:

d) encoding the foreground, background, and mask layers with a forward discrete wavelet transformation encoder.

3. The method of claim 2 wherein the foreground and background are JPEG 2000 encoded, wherein the mask is encoded with one of a JBIG and a JBIG2 encoder.

4. The method of claim 1 wherein step c) further comprises the steps of:

i) determining a layer base color and offsets to a common reduced area of each layer to identify image and mask layer values for all regions except an overlapped common reduced area; and

ii) separating the overlapped common reduced area into foreground and background layers.

5. The method of claim 1 wherein step c) further comprises the steps:

i) classifying each pixel within a selected layer as relevant or irrelevant; and

ii) applying a smoothing filter to each irrelevant pixel, p_c, proceeding in a raster scan order to interpolate a value for that irrelevant pixel.

6. The method of claim 5 wherein a normalized weighted average of the relevant pixels and the causal irrelevant pixels contribute to the interpolated value.

7. The method of claim 5 wherein the smoothing filter is a weighted Gaussian filter.

8. The method of claim 7 wherein each element of the smoothing filter is of the form $w_{kl}V_{kl}$, wherein V_{kl} is a non-weighted filter value, wherein w_{kl} is a function of its associated pixel causality and relevance.

9. The method of claim 8 wherein $w_{kl} = 0$ for the center pixel (p_c) and any non-causal irrelevant pixel.

10. The method of claim 8 wherein $w_{kl} = m_1$ if its associated pixel is a relevant pixel, wherein $w_{kl} = m_2$ if the associated pixel is a causal irrelevant pixel.

11. The method of claim 10 wherein $\frac{m_1}{m_2} > 1$.

12. The method of claim 10 wherein $\frac{m_1}{m_2} = 2$.

13. The method of claim 1 wherein step b) further comprises the steps of:

i) dividing a selected layer into a plurality of decision regions (D_{ij}) and associated analysis regions (A_{ij}), wherein each $D_{ij} \subseteq A_{ij}$; and

ii) assigning the entire region D_{ij} to one of the background and foreground layers, if a contrast of A_{ij} does not exceed a pre-determined threshold.

14. The method of claim 13 wherein the entire region D_{ij} is assigned to the foreground or background layers based on whether the average pixel value AVG(Dij) is closer to an average pixel value of neighboring foreground regions or neighboring background regions.

15. The method of claim 1 wherein step b) further comprises the steps of:

i) dividing a selected layer into a plurality of decision regions (D_{ij}) and associated analysis regions (A_{ij}), wherein each $D_{ij} \subseteq A_{ij}$; and

ii) distributing the pixels of D_{ij} between the background and foreground layers, if a contrast of A_{ij} exceeds a pre-determined threshold.

16. The method of claim 15, wherein step b)(ii) further comprises the steps of:

i) separating the pixels of A_{ij} into two groups, GROUP_1 and GROUP_2;

ii) compute an average (AVG_1, AVG_2) for each group; and

iii) mutually exclusively assigning the pixels of D_{ij} in GROUP_1 and GROUP_2 to a selected one of the foreground and background layers based on a comparison of the relative luminance of GROUP_1 and GROUP_2.

17. A method of preparing an image for efficient wavelet transform compression, comprising the steps of:

a) separating the image into foreground and background image layers, and a mask layer; and

b) applying a smoothing filter to interpolate irrelevant pixel values in the foreground and background layers for coder efficiency.

18. The method of claim 17 wherein a normalized weighted average of the relevant pixels and the causal irrelevant pixels contribute to the interpolated value.

19. The method of claim 17 wherein the smoothing filter is a weighted Gaussian filter.

20. The method of claim 17 wherein each element of the smoothing filter is of the form $w_{kl}V_{kl}$, wherein V_{kl} is a non-weighted filter value, wherein w_{kl} is a function of its associated pixel causality and relevance.

21. The method of claim 20 wherein $w_{kl} = 0$ for the center pixel (p_c) and any non-causal irrelevant pixel.

22. The method of claim 20 wherein $w_{kl} = m_1$ if its associated pixel is a relevant pixel, wherein $w_{kl} = m_2$ if the associated pixel is a causal irrelevant pixel.

23. The method of claim 22 wherein $\frac{m_1}{m_2} > 1$.

24. The method of claim 22 wherein $\frac{m_1}{m_2} = 2$.